

18. Illustrate the steps involved in the initiation of prokaryotic translation and the importance of the Shine-Dalgarno sequence and initiation factors.
 19. Describe the Lac operon in *E. coli* and explain how lactose controls its gene expression.
 20. Classify gene mutations with examples and explain their potential effects on protein structure and function.
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NOVEMBER/DECEMBER 2025

FBC52/CBC52 — MOLECULAR BIOLOGY

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. State the function of RNA primase.
2. Define bacterial conjugation.
3. "The enzyme responsible for transcription in prokaryotes" Explain.
4. Name a retrovirus and give its significance in reverse transcription.
5. What is peptidyl transferase?
6. What is the start codon?
7. Mention the function of the attenuator region in the Trp operon?
8. Give a note on insertion sequences.



9. What is the role of DNA polymerase in DNA repair?
10. Define gene mutation.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Describe the role of bacteriophages in bacterial transduction.

Or

- (b) Comment on the significance of the hybrid DNA band in the Meselson-Stahl experiment for DNA replication.

12. (a) Describe the role of reverse transcriptase in retroviruses.

Or

- (b) Illustrate the structure of the prokaryotic RNA polymerase holoenzyme.

13. (a) Brief the significance of the degeneracy of the genetic code.

Or

- (b) Explain the importance of the ribosome in protein synthesis.

14. (a) What is the leader sequence in the Trp operon and how does the ribosome control attenuation? Explain.

Or

- (b) Define transposons and elucidate the mechanisms by which they move within the genome.

15. (a) Discuss the types and causes of changes in chromosome number with examples.

Or

- (b) Outline the main mechanisms by which DNA repair occurs.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Elaborate on the mechanism of DNA replication in prokaryotes.
17. Outline the three main stages of transcription in prokaryotes and the process involved in each stage.

